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④ 截頭n角錐形の圧電型スピーカー

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⑦ 公開 昭56-99988

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⑫ 参考文献

実公 昭49-23466 (JP, Y1)

特開 昭47-17417 (JP, A)

⑬ 実用新案登録請求の範囲

正n ($n: 3, 4, 5$ の整数) 角形の面を開口面とし、互に合同な正n角形によって囲まれる凸多面体の中心と前記正n角形の各辺との間に形成する正n角錐の各錐面を外側面とし、截頭n角錐形の壺型フレーム1の底面に貫通孔4を設け、この貫通孔4の内縁部に圧電性セラミック等からなるユニモルフ振動子2の外縁部を固定し、このユニモルフ振動子2および壺型フレーム1に振動板3を組込んだことを特徴とする截頭n角錐形の圧電型スピーカー。

考案の詳細な説明

本考案は多面体のスピーカーシステムに組込み特に高音を再生するスピーカーに関する。

正多面体は正4面体、正6面体、正8面体、正12面体、正20面体の5種類があり、夫々の面の形は正4面体においては互に合同な正三角形、正6面体においては互に合同な正4角形、正8面体においては互に合同な正5角形、正12面体においては互に合同な正3角形をなしている。

本考案は以上のごとき多面体の各面に配置する

スピーカーに係り、正n ($n: 3, 4, 5$ の整数) 角形の面を開口面とし、互に合同な正n角形によつて囲まれる凸多面体の中心と前記正n角形の各辺との間に形成する正n角錐の各錐面を外側面とし、截頭n角錐形の壺型フレーム1の底面に貫通孔4を設け、この貫通孔4の内縁部に圧電性セラミック等からなるユニモルフ振動子2の外縁部を固定し、このユニモルフ振動子2および壺型フレーム1に振動板3を組込んだことを特徴とした截頭n角錐形の圧電型スピーカーである。

このように構成した本考案の截頭n角錐形の圧電型スピーカーを多面体のスピーカーシステムに組立るには、正12面体を例にとると、開口面の形が正5角形の圧電型スピーカーを頂次錐面と錐面とで固定してゆき、合計12ヶの截頭5角錐形の圧電型スピーカーの錐面の固定を完了すると正12面体のスピーカーシステムとなる。錐面と錐面とを固定するには、その接合面積が比較的大きいためゴム系などの接着剤で接着することによく、また夫々の截頭5角錐形の圧電型スピーカーは夫々5つの錐面で接着しあつて、全体として強固な正12面体形のスピーカーシステムとなる。また、正4面体、正6面体、正8面体、正20面体の形をなすスピーカーシステムについても以上に説明した正12面体形のスピーカーシステムの場合と同様に用いることができる。

正n面体形のスピーカーシステムに組立ると、高音域の指向特性が改善され、全方向に音波を放射するものになる。また、各截頭n角錐形の圧電型スピーカーを並列接続することにより、いづれの截頭n角錐形の圧電型スピーカーも再生音圧レベルを下げることなく同じものとなる。また、パワー・アンプとの整合の点に関し、ユニモルフ振動子1個の静電容量をC₀とするとそのインピーダンスZ₀は、

$$Z_0 = 1/\omega C_0$$

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となり、周波数が5000Hzで約1000Ω程度の値となるが、各截頭n角錐形の圧電型スピーカーの並列接続の合成インピーダンス値は $1/n$ に下り、パワーアンプとの整合がよくなる。

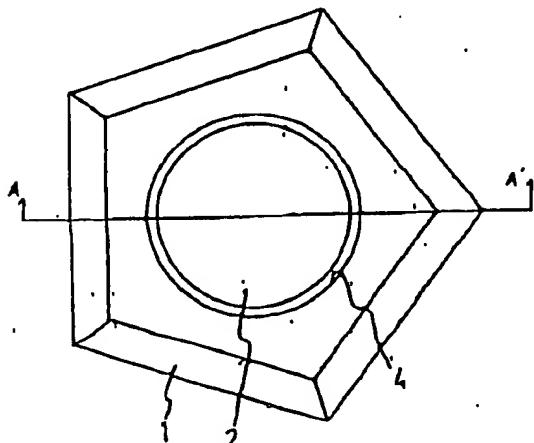
また、本考案の截頭n角錐形の圧電型スピーカーは、斜面上に説明した多面体のスピーカーシステムとして用いるほか単独でバツフル板に取り付けて用いることもできる。

4

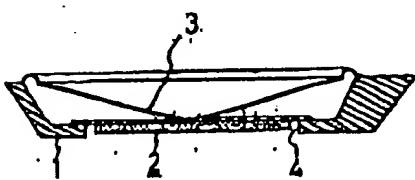
図面の簡単な説明

第1図本考案に係る截頭5角錐形の圧電型スピーカー裏面図、第2図は第1図のA-A'断面図、第3図は本考案に係る截頭5角錐形の圧電型スピーカーを用いた正12面体形のスピーカーシステムの正面図。

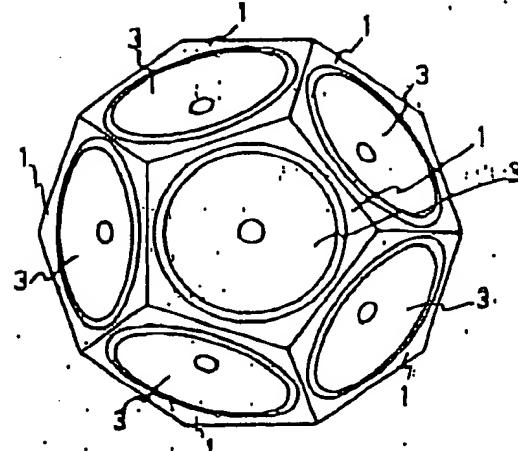
5 1……フレーム、2……ユニモルフ振動子、3
……振動板、4……貫通孔。



第1図



第2図



第3図

English Translation of Japanese Utility Model Laid-open (KOKAI)
Publication No. Sho 59-31105

Title: Piezoelectric loudspeaker having a shape of an n-gonal pyramid with its head cut off

What is claimed is:

A piezoelectric loudspeaker having a shape of an n-gonal pyramid with its head cut off, which comprises:

an opening face having a regular n-gon (n is an integer of 3, 4, 5);

an outer lateral face defined by a pyramid surface of the n-gonal pyramid which is marked by both a peripheral edge of the regular n-gonal shape and a center of a convex polyhedron which is formed by congruent regular n-gons;

a through hole 4 provided at a bottom face of an urceolate frame 1 of the n-gonal pyramid with its head cut off having the face formed by cutting off the pyramid head as an outer bottom face;

a unimorph transducer 2 made of piezoelectric ceramic etc. and provided at an inner peripheral portion of the through hole 4 by fixing an outer peripheral portion of the unimorph transducer 2 to the inner peripheral portion; and

a vibration plate 3 mounted both on the unimorph transducer 2 and on the urceolate frame 1.

Detailed Description of the present Invention

The present invention relates to a loudspeaker to reproduce especially high-pitched sounds which is built into a speaker system having a shape of polyhedron.

Regular polyhedron includes 5 kinds of polyhedron, that are a regular tetrahedron, regular hexahedron, regular octahedron, regular dodecahedron and regular icosahedron. These polyhedrons are made of congruent regular triangles for the tetrahedron, congruent regular tetragons for the hexahedron, congruent regular triangles for the regular octahedron, congruent regular pentagons for regular dodecahedron, and congruent

regular triangles for regular icosahedron, respectively.

The present invention relates to the speaker provided on each face of the polyhedron, and the speaker is a piezoelectric loudspeaker having a shape of an n -gonal pyramid with its head cut off, which comprises an opening face having a regular n -gon (n is an integer of 3, 4, 5);

an outer lateral face defined by a pyramid surface of the n -gonal pyramid which is marked by both a peripheral edge of the regular n -gonal shape and a center of a convex polyhedron which is formed by congruent regular n -gons;

a through hole 4 provided at a bottom face of an urceolate frame 1 of the n -gonal pyramid with its head cut off having the face formed by cutting off the pyramid head as an outer bottom face;

a unimorph transducer 2 made of piezoelectric ceramic etc. and provided at an inner peripheral portion of the through hole 4 by fixing an outer peripheral portion of the unimorph transducer 2 to the inner peripheral portion; and

a vibration plate 3 mounted both on the unimorph transducer 2 and on the urceolate frame 1.

The above-mentioned piezoelectric loudspeaker having a shape of an n -gonal pyramid with its head cut off can be assembled as follows. For the regular dodecahedron, for example, each pyramid surface of the speaker having the shape of the regular pentagons is fixed one-by-one. After completing the fixation of a total of 5 piezoelectric loudspeakers, a speaker system having a shape of the regular dodecahedron can be obtained. For the fixation between the pyramid surfaces, a rubber adhesive etc. can be adequately used as an area of the pyramid surface which can be used for bonding is comparatively large. A physically strong dodecahedron speaker system as a whole can be obtained since the loudspeakers having pentagonal shape are bonded with each other at their 5 pyramid surfaces.

In addition, the regular tetrahedron, regular hexahedron, regular octahedron, regular icosahedron speaker systems can be used in the same way as in the case of the regular dodecahedron speaker system mentioned above.

Once the regular n -gonal speaker system is assembled, directional characteristics can be improved in high-frequency range and acoustic waves can be emitted omnidirectionally. Furthermore, when each

speaker is connected in parallel, all speakers reproduce the same sound pressure respectively, without dropping of the sound pressure. As for matching with respect to a power amplifier, impedance Z_0 can be expressed by the following equation, if electric capacitance of one unimorph transducer is C_0 .

$$Z_0 = 1/\omega C_0$$

When the number of frequency is 5000Hz, the value becomes about 1000Ω level. And the value of synthetic impedance reduces to $1/n$ when the speakers are connected in parallel. Therefore, matching with the power amplifier becomes well.

Further, the piezoelectric loud speaker having the n-gonal pyramid with its head cut off of the present invention can be used by attaching it separately to a baffle plate, beside the speaker system mentioned above.

Brief Description of the Drawings.

Fig. 1 is a back side view of a piezoelectric loudspeaker having a shape of an n-gonal pyramid with its head cut off of the present invention.

Fig. 2 is a sectional view along A-A' in Fig. 1.

Fig. 3 is a front view of a speaker system of a regular dodecahedron type which is formed with the loudspeakers of the present invention.

- 1.....frame
- 2.....unimorph transducer
- 3.....vibration plate
- 4.....through hole